CONCLUSION

At the time of settlement for Utah (1847) 450 vertebrate species inhabit the southeastern region. Today (1990) there are 481 species present: 42 piscinian (fish); 13 amphibian, 36 reptilian, 285 avian (birds), and 105 mammalian. The increase in total vertebrate species numbers is attributed to the introduction of 39 exotics that were not present at the time of settlement. Seven native species, three of which are endangered in other areas where they still survive, have been extirpated. Another, the passenger pigeon, is extinct. In addition, eight native species that remain inhabitants of the region are considered to be endangered with extinction. Yet another native species is classified as threatened and 46 are classed as rare.

The implications of these losses are tremendous. While the natural world is by no means stable, and species have evolved and become extinct throughout time, current losses have occurred primarily due to man's impact on the environment. Loss of habitat, environmental pollutants, and disturbances during crucial time periods take their toll on wildlife populations. Continuing encroachment of human settlement into wildlife us areas is likely to cause increased stress and pressures on wildlife.

This publication has focused on critical habitats, crucial time periods, and life requisite requirements for each of the species inhabiting southeastern Utah. Final analysis (Table 6) of wildlife distribution throughout the region recounts patterns of habitat utilization. Although not numerically assessed, experience has shown ecotone areas to support the greatest variety and numbers of wildlife.

A majority of piscinian (fish) species inhabit streams (43 to 90%) as compared to lakes (24 to 74%). Lower elevation stream reaches are utilized by the greater percentage of fish species (90% of the fish inhabit desert streams and 76% inhabit submontane streams, whereas only 46% utilize stream reaches of montane elevations). The great diversity of fish species at lower elevations is due to the more expansive water acreages at lower elevations that tend to supply a greater diversity in fish habitat. In addition, cold water fish of montane elevations are apt to descend and survive in waters of lower elevations more readily than warm water species will ascend and adjust to colder temperatures. Within inhabited water bodies, water quality parameters such as temperature, dissolved oxygen concentrations, total dissolved solid concentrations, turbidity, and "pH" determine the species present and vigor of populations.

Between 69% and 92% of all amphibians occur in wetland ecosystems. The submontane elevations support the greatest proportion (92%) of species due to relatively favorable environmental conditions. The scaleless, permeable amphibian skin requires constant moisture to retain body fluids. Both water quantities and water quality parameter are of importance to the survival of individual amphibians and ultimately populations of the species. If negative impacts to water sources occur, local amphibian populations are incapable of moving great distances to new locales.

Reptiles are not nearly as dependent on wetlands since their scaly skin covering provides resistance to desiccation. However, riparian areas are heavily utilized (50 to 72% of all species) for the available drinking water, prey, and vegetative resource (cover). The moist soil characteristic of riparian zones also provides preferred nesting habitat for many reptiles. Desert and submontane riparian areas are utilized most heavily by reptiles.

Submontane pinyon-juniper and mountain brush ecosystems each support 78% of the reptile species. At desert elevations, saltbush-grass accounts for 81% of reptile species and blackbrush communities support 75% of reptile species. Grassland and sagebrush grass ecosystems also support near or above 80% of all reptilian species at the submontane of lower elevations. Barren ecosystems (talus slopes, rocky terrain, or bare soil) are utilized as basking areas to provide temperature regulation. They support 58% and 64% of reptile species at desert and submontane elevations, respectively.

The greatest proportion (60 to 81%) of bird species inhabit riparian areas. Riparian corridors are utilized during breeding, foraging, and migrating activities. Submontane elevations show the greatest use (81%) due in part to species movement through the zone when accessing between desert and montane elevations.

Submontane riparian ecosystems are also utilized by the greatest percentage (73%) of mammal species. Water, cover, and forage are excellent in these areas. The abundant food supplies of pinyon-juniper, mountain brush, and sagebrush-grass ecosystems also attract numerous species.

Overall, submontane riparian zones were shown to support 72% of all terrestrial species. Both desert and submontane elevations ranked high in importance relative to all other ecosystems (61% and 72% of all species, respectively). Although other ecosystems are important to various classes or species, none can boast the diverse array of wildlife dependent on riparian areas.

Characteristics of the riparian ecosystem along with the corresponding needs of wildlife interact to support this conclusion. Most wildlife species depend on the availability of good water sources for drinking. Life along riparian zones affords the opportunity to access water while remaining in an area generally abundant in its production of forage and cover. In addition, riparian corridors offer favorable travel lanes between disjunct geographic areas or ecosystems. Some species may utilize riparian zones for many facets of their life requirements while others may only make forays to the areas for specific water or food needs.

Life requisite information assembled in this publication is by no means exhaustive of the available information for each species. However, it provides an insight to particular areas of concern as we strive to maintain healthy wildlife populations.

It has been the intent of the authors to provide this information to land-use planners for the purpose of successfully developing management schemes based on wildlife attributes. Specifically, if a project area is known to support populations of certain species, plans can be developed to preserve critical valued habitat needs and to avoid disturbances to critical areas during crucial time periods. Ecosystems must also be assessed as complete units where impacts to anyone species could ultimately determine the fate of another. These precautions will allow for reductions in impacts and will likely help to maintain viable populations of our wildlife inhabitants.

Where there is to be inevitable loss or degradation of habitats, mitigation can help to lessen the impacts. Land-use planners should be aware and willing to include mitigation strategies in project planning. Terrestrial mitigation may address the need to re-establish lost vegetative communities, provide wildlife passage across barriers (conveyors, roads, ditches, etc.), or replace lost water sources. Aquatic mitigation can include maintenance of in stream flows, stream bank stabilization, or installation of fish passage structures.

There are numerous mitigation alternatives available to the knowledgeable land-use planner. Only by understanding wildlife needs and the relative biological value of ecosystems can planning successfully incorporate mitigation practices. Readers are encouraged to become familiar with Utah Division of Wildlife Resources Publication No. 90-3, "Mitigation Technologies for Man-Made Impacts."

Table 6. Numbers (#) of vertebrate wildlife species per class of wildlife and the proportion (%) of that total which now (1990) inhabit each ecosystem by ecological association within southeastern Utah.

Proportion (%) of species that inhabit each ecosystem by (1) Cold Desert (3,700 -5,800 ft.); (2) Submontane (5,500-8,500 ft.); and (3) Submontane (6,500-12,721 ft.) ecological associations.

UPLANDS

Class of Wildlife Number of Species	Urban			Agricultural			Alpine			Spruce/Fir			Aspen			Ponderosa		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Piscinian (fish) 42																		
Amphibian 13	8	8	8	85	92				8			8			8			8
Reptilian 36	11	11	14	47	47				0			31			36			44
Avian (bird) 285	29	31	21	43	40				8			29			28			31
Mammalian 105	16	17	12	23	28				23			23			39			44
Total Species 481	22	23	17	36	36				10			29			28			31

Class of Wildlife Number of Species	Sagebrush/Grass			Mountain Brush			Pinyon/Juniper			Saltbrush/Grass			Blackbrush			Grassland			Barren		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Piscinian (fish) 42																					
Amphibian 13	31	31	8		15			15		38			31	39		46	46	15	0	0	0
Reptilian 36	78	86	42		78			78		81			75	73		81	78	36	64	58	25
Avian (bird) 285	26	29	17		36			37		19			17	14		23	21	13	10	10	6
Mammalian 105	53	67	40		59			64		44			43	38		44	49	29	21	35	24
Total Species 481	33	39	22		40			42		28			26	23		30	30	17	15	18	11

WETLANDS

Class of Wildlife Number of Species	Marsh			Mesic Meadow			Riparian			Stream			Lake		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Piscinian (fish) 42										90	76	43	74	24	24
Amphibian 13	69	92	54	69	92	54	69	92	54	69	92	54	69	92	54
Reptilian 36	8	6	8	14	17	17	64	72	50	6	6	6	6	6	6
Avian (bird) 285	45	42	30	26	27	23	74	81	60	29	27	22	30	28	23
Mammalian 105	19	24	20	15	23	20	49	73	49	4	4	4	4	4	3
Total Species 481	33	33	24	22	25	21	61	72	52	20	19	16	21	22	16

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Index by Common Name of Vertebrate Species Inhabiting Southeastern Utah